



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,209	07/24/2003	Irving W. DeVoe	41056-101	9677
26486	7590	12/12/2007	EXAMINER	
BURNS & LEVINSON, LLP			MENON, KRISHNAN S	
125 SUMMER STREET			ART UNIT	PAPER NUMBER
BOSTON, MA 02110			1797	
			MAIL DATE	DELIVERY MODE
			12/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/626,209	DEVOE, IRVING W.
	Examiner	Art Unit
	Krishnan S. Menon	1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 19 November 2007.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-42,47-52,57-65,67,68,70 and 71 is/are pending in the application.
 - 4a) Of the above claim(s) 1-41 and 60-65 is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-42,47-52,57-65,67,68,70 and 71 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 1-42, 47-52, 57-65, 67,68, 70 and 71 are pending as amended in the RCE of 11/19/07, which claims 1-41 and 60-65 were withdrawn.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 57-59 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 57 recites a natural phenomenon – principle of osmosis – and is not directed to any practical application, because the claims do not require any physical transformation to produce and sustain the vacuum, and the claims do not recite any structure that would enable one of ordinary skill in the art to make use of the vacuum so generated. The claims as recited would impermissibly cover every substantial practical application of, and thereby preempt all use of, the natural phenomenon or law of nature of “osmosis”.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 42, 47-52, 57-65, 67,68, 70 and 71 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains

subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Applicant's claims recite a process for producing energy derived from the chemical potential of concentrated solute-solutions using a semi-permeable membrane. Applicant's specification, at page 26, lines 7-22, (paragraph 0090 of the Pre-Grant Publication) and figure 10 A and B, shows the balance between input energy and output energy. As an example, take column 2 of figure 10 A and B, which show AlCl₃.6H₂O as solute and water as solvent. This shows output energy as 1634 KWh/day more than what was supplied, and the calculation includes all energy inputs required for running the system including any external energy supplied. It shows that 1634 KWh per day of energy is derived from nowhere, which is against the known principles of physics. Therefore the process is not enabling.

Applicant does make statements about extracting ambient energy (ultimately from the sun) in paragraph 90 and heat or radiant energy in paragraph 6, but there is no disclosure enabling these statements, nor are they included in the energy balance in figures 10A and 10B. The description for figure 5 at page 18 of the specification states, "one skilled in the art would recognize that any suitable means, such as heating, may be used to vaporize the solvent". However, these descriptions appear as general statements and additional steps that may be included to applicant's invention, without sufficient enabling details; applicant's core process appears to be generating energy from nowhere.

Lines 15-25 in page 18 describes vacuum as the source of energy, and that lowering the vaporization temperature would conserve energy. Regarding generating and maintaining vacuum; applicant's specification discloses (quoted from the PGPUB of the applications):

[0061] In the illustrated configuration, the blowdown receiving chamber 56, the condenser 57 and the solvent chamber 20 are hermitically joined and the internal space throughout is under vacuum at or near the vapor pressure of the solvent. The maintenance of the temperature inside the solvent chamber 20 and the condenser at or below the vapor pressure point of the solvent at a given low pressure (i.e., vacuum) promotes vaporization of the solvent, as well as transformation of the vapor into a liquid in the condenser 57 and preservation of a liquid state in the solvent chamber 20. For example, lowering the pressure over the solvent in the solute solution exhausted from the exhaust channel and into the blowdown receiving chamber 56 lowers the boiling point of the solvent, allowing vaporization to occur at a lower temperature, which thereby conserves energy.

[0062] As an example, the vaporization point of water at 760 mm (1 atmosphere) of mercury (Hg) is 100.degree. C., whereas water vaporizes at 51.degree. C. at 100 mm Hg. Another example is the solvent methanol, a solvent in which FeCl₃, LiCl, and AlCl₃ are highly soluble, vaporizes at 64.5.degree. C. at 760 mm Hg; however, at 100 mm Hg methanol vaporizes at a temperature of 21.degree. C. Isopropanol is an example of a solute that has a lower boiling point than the solvent H₂O. The power required to vaporize such solvents or solutes can come from a portion of the energy generated by an alternator(s) or generator(s) powered by the energy generating system 10.

[0063] The vacuum may be induced or maintained in the solvent chamber 20, blowdown receiving chamber 56 and the condenser 57 by diffusion of solvent molecules from the solvent chamber 20 into the pressure chamber 30 leaving a void, as described above. According to a preferred embodiment, the low pressure (vacuum) over the solvent in the solvent chamber 20 is maintained constant within a small range by selectively opening and closing the solvent chamber for appropriate time intervals. One skilled

in the art will recognize that an external or bolt-on vacuum pump may also be used to achieve and/or maintain a vacuum.

[Emphasis added]

And in paragraph 67, it is disclosed that the vacuum pump may be operated by power generated by the system itself.

Since the claimed invention uses vacuum as the power source, and the above paragraphs indicate that the energy is derived from the system itself for generating the vacuum and no other *enabling disclosure* for energy supply for evaporating the solvent is disclosed, the process as disclosed and claimed is unsustainable, and therefore, non-enabling.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 57-59 are rejected under 35 U.S.C. 102(b) as being anticipated by Loeb (US 3,906,250).

Loeb'250 teaches (see figure 3 and 4) a method of producing vacuum comprising a semipermeable barrier separating a pressure chamber and a solvent chamber, wherein the pressure chamber has a solution (sea water) and solvent chamber has a solvent (river water), the solvent flows from the solvent chamber to the pressure

chamber across the membrane, and the solvent chamber has a vacuum (because pressure is zero atm in figure 3 and 4 in river water chamber). The claims recite the solvent chamber as closed and pressure chamber as open. The solvent chamber in the reference could be closed to flow of river water and the pressure chamber could be open to flow of sea water as desired, and the apparatus would be inherently capable of doing so. Note that the reference teaches that the process would eventually stop without flow, which supports the inherent teaching of closed solvent chamber (see column 4 lines 25-53, and especially 47-50). Under the principles of inherency, if a prior art device, in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. *In re King*, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986). See also figure 11, which is a closed system with the solvent chamber having only inflow, wherein the solvent chamber is at zero pressure.

The solute-solution is exhausted from the pressure chamber as in claim 58 – see flowing through the turbine.

With regard to the step of controlling the flow of solvent from the solvent chamber as in claim 59, the reference teaches that the transient process would ultimately stop without flow through the chambers, and a continuous process could be carried out by the outlined control of the process – see column 4 line 55 – column 5 line 10, and figures 3a and 4a. Please note that the river water pressure is still maintained

essentially at zero. See also figure 11, wherein the solvent chamber is at zero pressure, and the process is maintained continuous by a controlled inlet flow equal to the flow through the membrane.

Claim 57 is also not patentable because it is only an elaboration of the principle of osmosis, wherein when a solvent is separated from a solution by a membrane, the pressure in the solvent chamber will reduce and the pressure in the solution chamber will increase as the solvent migrates into the solution through the membrane because of osmosis. The solvent chamber thus would have a vacuum, or reduced pressure.

Figure 1, 2a and 2b of Loeb explains this principle.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 42, 50-52, 67, 68, 70 and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over by DE 3121968.

DE teaches a method of pressurizing a solute solution and converting the pressure to energy (by a turbine or by a reciprocating machine, which is a piston machine: see claims 22, page 8, and 28, page 9 of the English translation of the reference; piston in the reciprocating machine has linear displacement) using a solvent by passing the solvent across into the solution through a semipermeable membrane –

see figures. The solution is exhausted after the pressure is converted to energy as claimed. The solvent chamber is pressurized by a pump – see figure 1, pump 22.

The claims differ from the teaching of the reference in the use of vacuum for evaporating the recycling solvent. However, DE teaches solvent recycle; and that the process of evaporation can be optimally selected from the various available methods – see pages 16-20 of the English translation (especially, page 18) – including air circulation, heat pump, and solar energy. Using vacuum for evaporation, particularly at ambient temperature, is known in the art. One would use vacuum to increase the rate of evaporation and prevent air leak into the system by maintaining a vacuum. See, for example, Loeb'250, column 11 lines 59-65: maintaining a vacuum in the condenser means or implies that the evaporation is conducted in a vacuum, or reduced pressure.

DE teaches adding external energy to perform the recycling process as claimed – see pages 16-20 of the English translation and claims 6 and 7.

3. Claims 42 and 47-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Loeb (US 3,906,250) in view of DE 31 21 968.

Claims 42 and 50: Loeb'250 teaches a method of producing high pressure and energy by providing (see figure 6) a solvent chamber (river water), a solute-solution chamber (concentrated brine), semipermeable membrane separating the solvent and solution chambers (in 60), so that solvent diffuses through the membrane to pressurize the solution, converting the increased pressure to energy (by turbine 67). See also column 8 line 59 – column 9 line 47. Also see figure 10, 11, etc. The pressure in the

membrane chamber, that is, the that of the evaporated and condensed liquid, in figures 10 or 11 can be less than that of the atmosphere, depending on how they are operated. Pressure on the solvent side of the membrane is shown as "0". Even if not explicitly stated, it would be obvious that the pressure on the solvent side of the membrane can be less than atmospheric, or that there can be a vacuum.

Claims differ from the teaching of Loeb'250 in the recitation of the hydraulically driven piston for energy conversion, or displacement. Loeb teaches a turbine for energy conversion (and also mentions piston engines – column 11, lines 52-55). DE teaches that a reciprocating machine or a turbine could be used as alternates for the process. It would be obvious to one of ordinary skill in the art at the time of invention to use a reciprocating machine, which works with linear displacement of pistons, as alternate but equivalent to the turbine for energy conversion in the teaching of Loeb. Also, an express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. In re Fout, 675 F.2d 297, 213 USPQ 532 (CCPA 1982). In this case, a reciprocating engine or a turbine are equivalents for power conversion.

Claims 49: evaporation and return of solute to the pressure chamber – see evaporation pond 70 and the return line for concentrated brine. Also see figure 10 and column 13 lines 28-50.

Claims 47 and 48: see figure 10 wherein the solvent evaporated (in distillation plant 130) is also recycled through the solvent chamber of 124.

Claims 51 and 52 further recite the step of pressurizing the solvent chamber (claims 51 and 54) by a pump (claims 52 and 55), which Loeb'250 does not specifically teach. However, Loeb'250 teaches passing the lower osmotic pressure water (river water) in figure 6 or the condensed solvent in figure 10 and 11, which inherently require means for pumping or a pump. A *prima facie* case under 35 U.S.C. 102 /103 could be made if a process step is inherent: *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977) (Applicant claimed a process for preparing a hydrolytically-stable zeolitic aluminosilicate which included a step of "cooling the steam zeolite ... at a rate sufficiently rapid that the cooled zeolite exhibits a X-ray diffraction pattern" All the process limitations were expressly disclosed by a U.S. patent to Hansford except the cooling step. The court stated that any sample of Hansford's zeolite would necessarily be cooled to facilitate subsequent handling.

Regarding recycling solvent by evaporation using vacuum, see rejection over DE reference in paragraph 2 above.

Response to Arguments

Applicant's arguments filed 11/19/07 have been fully considered but they are not persuasive.

With respect to the 112, first paragraph rejection, applicant acknowledges that the flowing of a solvent across a semipermeable membrane is well known, and does not require additional input of energy. The acknowledgement of the "well known" nature of this claim makes it unpatentable. Applicant may counter argue that the solvent chamber

being closed is not argued as well known. However, irrespective of the solvent chamber being closed or open, the osmosis process will take place, and if the solvent chamber is closed, the loss of solvent from the solvent chamber would create a vacuum. This claim and its supporting disclosure are not enabling for one of ordinary skill in the art to use the vacuum so generated.

Loeb teaches the principle of osmosis and how to make practical use of this principle, and thus the claim is inherently anticipated, or obvious.

With respect to DE 3121968, the reference teaches using external energy such as solar or heat pump, etc., with solvent recycle – page 18.

Argument that applicant disputes that claims 6 or 7 (of DE reference) call for the additional input of energy. This is not convincing. The claims as well as the cited pages of the reference clearly teaches use of external energy such as solar to evaporate the solution, and obtain solvent vapor. Solvent vapor is then described as recycled as condensate for power recovery, and described as "recirculating currents". More over, recycling the condensate as solvent for the membrane process is obvious even if it is not explicitly taught.

Argument that Loeb does not teach a vacuum in the solvent chamber: this is further explained in the rejection. ***The cited portion of the reference, Loeb at lines 31-36 of column 13, is quoted erroneously. The "(π high)" pertains to the concentrated solution 134.*** The vapor stream 136, being free of solute, will have no osmotic pressure.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S. Menon whose telephone number is 571-272-1143. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Sample can be reached on 571-272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Krishnan S Menon
Primary Examiner
Art Unit 1797